REMARKS / ARGUMENTS

Applicants thank the Examiner for the Office Action of November 1, 2004. This Amendment is fully responsive thereto. Claims 1, 24 and 28 have been amended, support for which may be found in the Figures.

In the November 1 Office Action, the Examiner rejected:

a) claims 1, 3, and 11 under 35 USC 103(a) as being obvious over U.S. Patent No. 4,690,074 (Norton) in view of U.S. Patent No. 4,217,132 (Burge et al.)

b) claims 2 and 4-10 under 35 USC 103(a) as being obvious over Norton in view of Burge et al. and U.S. Patent No. 4,329,932 (Takahashi et al.)

c) claims 12-15 and 24-31 under 35 USC 103(a) as being obvious over Norton in view of Burge et al., Takahashi et al., and U.S. Patent No. 5,909,003 (Hura et al.); and

d) claims 17-23 under 35 USC 103(a) as being obvious over Norton in view of Burge et al., Takahashi et al., Hura et al., and U.S. Patent No. 6,244,854 B1 (Satchell, Jr. et al.).

Applicants respectfully traverse the rejections for at least one or more of the following reasons: a) the above references fail to disclose, teach or suggest all of the claim limitations, b) the Examiner has not pointed out which portions of the references' disclosures disclose, teach or suggest certain claim limitations, and c) the Examiner has not provided a legally sufficient motivation as to why one of ordinary skill in the art would hypothetically modify the references in the manner suggested by him.

Applicants have amended claim 1 in order to claim one aspect of the invention. Amended claim 1 is a process for improving a combustion system for burning solid fuel particles in a combustion chamber and creating a flue gas. It includes the following steps. A fuel gas stream is created by mixing the solid fuel particles with a conveying gas. The fuel gas stream is transported through a fuel duct extending toward the combustion chamber allowing the fuel gas stream to be introduced into the combustion chamber at a fuel exit plane. The fuel exit plane is

coincident with a wall of the chamber. An oxygen stream is injected through an injection device into said fuel gas at an oxygen injection location selected to create a mixing zone to mix the oxygen stream and the fuel gas stream, wherein the mixing zone extends from a position upstream of the fuel exit plane.

In contrast to amended claim 1, each of the references cited in the rejections of the November 1 Office Action fail to disclose, teach or suggest a fuel exit plane coincident with a wall of the chamber, and/or a mixing zone extending from a position upstream of the fuel exit plane.

As seen in Figure 1 of Norton, to the extent that this reference addresses the location of the fuel exit plane, the fuel exit plane of this reference is not coincident with a wall of the combustion chamber. Rather the fuel exit plane at the terminus of burner pipe 26 is positioned within the kiln 10.

As seen in Figure 1 of Borge, to the extent that the apparatus disclosed in this Figure addresses the location of the fuel exit plane, the fuel exit plane of this reference is not coincident with a wall of the combustion chamber. Rather, the fuel exit plane at the terminus of fuel input tube 29 is positioned within the reaction chamber 21.

As seen in Figures 7 and 8 of Borge, the fuel exit plane of this reference is not coincident with a wall of the combustion chamber. Rather, the fuel exit plane at the terminus of inlet tube 29 is positioned within the reaction chamber 71.

As seen in Figure 1 of Takahashi et al., the fuel exit plane is not coincident with a wall of the combustion chamber. Rather, this fuel exit plane is positioned at the terminus of burner inlet tube 3 within the combustor 1.

As seen in Figure 2 of Takahashi et al., to the extent that the location of mixture of the fuel gas stream (from fan 16) and oxidant (A2) is addressed, the exact point from which the mixing zone starts extends is not disclosed. Rather, the relatively simple Figure 2 only shows a burner 13 at which pulverized coal from C1 and secondary air 19 are introduced. Also, Applicants respectfully point out that the oxidant introduced to the burner 13 is air (A2). Further, the fuel gas

stream 29 apparently mixes with any oxidant (residual existing in region GO or that injected from nozzle 20) *downstream* of the fuel exit plane (intersection of nozzle 29 and furnace 11. Applicants also respectfully point out that any residual oxidant resulting from combustion originating from burner 13 is not "injected". Furthermore, any oxidant mixed with fuel gas stream from nozzle 29 is air (A3).

As seen in Figure 1 of Hura et al., to the extent that this Figure addresses the location of mixture of oxidant and the fuel gas stream including coal, the exact location is not disclosed. Rather, this relatively simple Figure discloses a primary combustion zone 10 downstream of fuel injection means 13.

As seen in Figures 4 and 8 of Hura et al., fuel from passage 40 is first mixed with oxidant from passage 28/29 in a combustion chamber *downstream* of the fuel exit plane at the terminus of nozzle 42.

Thus, Applicants respectfully assert that none of the references cited in the rejections disclose, teach or suggest all of the claim limitations and request that the rejections be withdrawn.

With particular respect to the rejection of claim 3, neither Norton nor Burge et al. disclose selection of a target oxygen content in the flue gas or adjusting the total amount of oxygen entering the combustion chamber in order to yield the target oxygen content in the flue gas. As such, Applicants respectfully request that the rejection be withdrawn.

With particular respect to the rejection of claims 4-10, as stated above, neither Norton nor Burge et al. disclose, teach or suggest selection of target oxygen content in the flue gas or adjusting the total amount of oxygen entering the combustion chamber in order to yield the target O_2 content in the flue gas. Applicants recognize that Takahashi et al. teaches performing incomplete combustion of the first injection of coal and injecting oxygen or air to complete combustion. They further recognize that the oxygen content of the stack waste gas is measured. They further recognize that Takahashi et al. discusses the relationship between the levels of NOx and CO to the level of oxygen in the carrier

gas for the second injection of coal. However, they respectfully assert that Takahashi fails to disclose selection of a target oxygen content in the flue glas or adjusting the total amount of oxygen entering the combustion chamber in order to yield the target oxygen content in the flue gas. The mere fact that oxygen is injected and that the stack waste gas oxygen content is measured, does not mean that a target oxygen content of the flue gas has been selected, or that an oxygen content of the oxidant injected into the coal/conveying gas stream has been adjusted. As such, Applicants respectfully request that the rejection be withdrawn.

With particular respect to the rejection of claims 12 and 15, Applicants respectfully assert that Hura et al. fails to disclose, teach or suggest the claimed conveying gases. Applicants kindly point out that the various conveying gases required by claims 12 and 15 are those which form a fuel gas stream in combination with solid fuel particles. On the other hand, the portion of the disclosure recited by the Examiner for air or natural gas (col. 3, lns. 32-40) are directed not to conveying gases for conveying coal into the combustion chamber through fuel injection means 13, but are instead directed to completion of combustion in upper/downstream combustion zone 18 via injection of gaseous fuel at fuel injection means 14. Also, Applicants do not see where any of the references disclose, teach or suggest the limitations of these claims. As such, Applicants respectfully request that the rejection be withdrawn.

With particular respect to the rejection of claims 13-14, Applicants kindly point out that none of the portions of the disclosure recited by the Examiner disclose recirculated flue gas. As such, Applicants respectfully request that the rejection be withdrawn.

With particular respect to the rejection of claim 15, Applicants strenuously disagree with the Examiner's interpretation of "comprises about 20% oxygen". Applicants understand the Examiner to mean that pure oxygen includes 20% oxygen plus 80% oxygen. This improper type of interpretation would have the effect of preventing any applicant from claiming any percentage of a substance in a

"comprising"-type claim in order to distinguish the claimed invention from one which contains an amount greater than the claimed percentage. Applicants kindly ask the Examiner to reexamine this interpretation.

With particular respect to the rejection of claims 24-31, Applicants respectfully assert that the Examiner has not provided a legally sufficient obviousness rejection. First, he has not pointed out which portions of Norton in view Burge et al., Takahashi et al., and Hura et al. disclose, teach or suggest the required claim limitations. Second, the Examiner does not even mention the required distances and lengths and mathematical relationships therebetween of claims 24-27, the required angle and mathematical relationships between the angle and the required diameters and distances of claim 28, the required fuel duct and lance orientation of claim 29, and the locations of the oxygen injection of claims 30 and 31. Third, the Examiner has provided no reasoning as to why any of the "selected volume percentages or claimed diameters" would be capable of providing the same results as that of the invention. Fourth, the Examiner has not shown why one of ordinary skill in the art would be motivated to adjust them to fit the claim requirements. In order to expedite prosecution, Applicants kindly ask the Examiner to point out which portions of the prior art references teach these distances, diameters, angles and mathematical relationships, even to the extent that they do not disclose the precise numerical ranges/relationships required by the claims.

With particular respect to the rejection of claims 17-23, Applicants respectfully traverse the rejection because the Examiner has not provided a sufficient motivation for one of ordinary skill in the art to hypothetically modify Norton, Burge, Takahashi, Hura, and Satchell, Jr. et al. in the manner suggested by him. To the extent that Satchell, Jr. et al. addresses a lance configuration, it discloses a fairly specific configuration needed for accomplishing the goal of that disclosed invention: converging and diverging nozzles allowing propagation of combustion therethrough to produce one or more linear or curvilinear flame jet

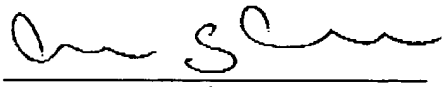
sheets. Applicants assert that one of ordinary skill in the art would likely understand the necessity of that configuration for accomplishing that goal, and that significant modification of the configuration would likely render the lance unsuitable for the specific purposes it is taught. Applicants kindly ask that the Examiner provide sufficient facts and reasoning as to why one of ordinary skill in the art would think otherwise.

CONCLUSION

Accordingly, it is believed that the present application now stands in condition for allowance. Early notice to this effect is earnestly solicited.

Should the Examiner believe that a telephone call would expedite prosecution of the application, he is invited to call the undersigned attorney at the number listed below. It is believed that no fee is due at this time. If that belief is incorrect, please debit deposit account number 01-1375. Also, the Commissioner is authorized to credit any overpayment to deposit account number 01-1375.

Respectfully submitted,



Christopher J. Cronin
Registration No. 46,513

Date: February 1, 2005
Air Liquide
5230 S. East Ave.
Countryside, IL 60513
Phone: (708) 579-7925
Fax: (708) 579-7801

CERTIFICATE OF TRANSMISSION UNDER 37 CFR 1.8(a)

I hereby certify that this correspondence is being transmitted via facsimile to telephone number 703-872-9306 on this 1st day of February, 2005.

Christopher J. Cronin